VOLUME 5. AIRMAN CERTIFICATION AND DESIGNATED EXAMINERS

CHAPTER 2. AIRLINE TRANSPORT PILOT CERTIFICATES

SECTION 2. FLIGHT TEST EVENTS IN AIRPLANES

75. APPLICABILITY. Sections 2 through 6 of this chapter provide inspectors and designated examiners with detailed guidance for the conduct of airline transport pilot (ATP) flight tests, conducted in the qualification curriculum segments of Federal Aviation Regulations (FAR) Parts 121 and 135 training programs. This guidance has been specifically developed to account for the conditions encountered in such programs, particularly for the wide variation in aircraft, simulators, and educational delivery systems currently used by FAR Parts 121 and 135 operators. Inspectors and designated examiners shall observe this guidance while conducting these flight tests instead of the guidance in FAA Order 8700.1, "General Aviation Inspector's Handbook", which applies to the testing of applicants trained and tested outside FAR Parts 121 and 135 training programs, where different conditions prevail. Section 2 of this chapter contains general direction and guidance for the conduct of all flight tests, regardless of whether a test is conducted in a flight training device (FTD), a flight simulator, or an airplane. Section 3 contains specific guidance for the conduct of flight tests in an FTD or a flight simulator. Section 4 contains specific guidance for the conduct of flight tests in an airplane. Sections 5 and 6 contain specific guidance for the conduct of flight tests in a helicopter.

77. ORAL TEST EVENTS. Inspectors and examiners should use the "ATP/Type Rating Oral Test--Airplane" job aid when conducting oral tests for ATP certificates with airplane category ratings or for airplane type ratings being added to ATP certificates (see figure 5.2.2.1.). The topics to be examined are printed on the job aid in an abbreviated form. Most of the topics are self explanatory; however, a discussion of selected topics for pilot applicants of airplanes requiring a flight engineer (FE) follows:

A. FE's Station. On airplanes requiring an FE, a pilot applicant must demonstrate a knowledge of controls and indicators at the FE's station. The applicant's level of knowledge must be sufficient for safe operation of the airplane if the FE is incapacitated or absent from the flight deck.

B. Takeoff Data. Although the duty of computing takeoff and landing data is usually accomplished by the FE, pilot applicants must be able to complete typical takeoff and landing data computations. These computations must include application of proper corrections (such as a contaminated runway, inoperative anti-skid, and minimum equipment list (MEL) or configuration deviation list (CDL) penalties).

C. Performance Computations. An applicant must demonstrate the ability to extract aircraft performance data (such as maximum allowable altitude, cruise power settings, and drift-down performance from the aircraft performance charts).

D. Weight and Balance. An applicant must demonstrate the ability to compute or validate weight and balance using the operator's procedures.

79. WAIVER AUTHORITY. FAR § 61.157(c) authorizes inspectors and examiners to waive certain events on the flight test as specified in FAR Part 61, Appendix A. Events that may be waived totally or partially are indicated on the job aids. The following guidance applies to the use of waiver authority:

A. The use of waiver authority is not automatic. Inspectors and examiners are cautioned to exercise judgment in the use of this authority. When an applicant demonstrates a high level of performance, inspectors and examiners should make liberal use of the waiver authority. When an applicant's performance approaches minimum acceptable standards, however, none of the events of the flight test should be waived.

B. Inspectors and examiners are cautioned that some waiver provisions apply to portions of a series of events rather than to the whole event (for example, the stall series). Other events have specific conditions that must be fully met before waiver authority may be exercised (for example, the second nonprecision approach). A discussion of the conditions and limitations of waiver authority is included with the discussion of the specific events in the following paragraphs.

81. PREPARATION AND SURFACE OPERATIONS EVENTS. Applicants shall be observed performing interior, exterior, and emergency equip- ment inspections and performing engine start, taxi, and powerplant checks in accordance with the operator's aircraft operating manual.

A. Exterior Inspection. The exterior inspection is not an extension of the oral phase in which systems knowledge is examined, but rather a demonstration of an applicant's ability to perform appropriate safety checks. Inspectors and examiners shall limit questions to only those necessary for determining if an applicant can recognize when a component is in an unsafe condition. The exterior inspection may be conducted before or after the flight test at the inspector's or examiner's discretion. Many operators have exemptions permitting the exterior preflight test event to be conducted using pictorial means. The exterior inspection may be waived when an FE is a required crewmember. When the exterior inspection is waived, pilot applicants shall be required to complete those cockpit, interior, and emergency equipment inspections defined as the pilot-in-command's (PIC) responsibility. Inspectors and examiners shall determine whether an applicant inspects these items in accordance with the procedures in the operator's aircraft operating manual.

B. Cabin Inspection. An applicant shall be evaluated on the ability to perform a cabin inspection when this inspection is specified as a PIC responsibility by the operator's aircraft operating manual. Inspectors and examiners should occasionally sample an applicant's knowledge of the location and use of emergency equipment in the cabin, and the operation of cabin doors, even when the cabin inspection is not designated as a flight crewmember responsibility.

C. Cockpit Preflight Inspection. An applicant shall be required to complete the cockpit preflight checks using the procedures specified in the operator's aircraft operating manual and using the appropriate checklists. The proper challenges and responses to the checklist must be used. When the flight test is conducted in a flight simulator, it is appropriate for the inspectors or examiners to present minor malfunctions to determine if the applicant is accurately performing the specified checks.

D. Engine Start Procedures. An applicant shall be required to perform an engine start using the correct procedures. When the flight test is conducted in a flight simulator, it is appropriate for inspectors and examiners to present an abnormal condition such as a hot-start or malfunctioning air or start valve. The abnormal condition should be carried through to the expected conclusion in line operations, for the purpose of evaluating crew coordination and the applicant's proficiency.

E. Taxiing or Sailing. Inspectors and examiners shall evaluate the applicant's ability to safely maneuver the airplane on the surface and to manage outside vigilance while accomplishing cockpit procedures. The applicant must ensure that the taxi path is clear of obstructions, comply with local taxi rules and control tower instructions, properly use checklists, and maintain control of the crew and airplane.

F. Powerplant Checks. Powerplant checks must be accomplished in accordance with the appropriate checklist and procedures before takeoff. In a flight simulator, inspectors and examiners should present appropriate instrument or system malfunctions to determine if the applicant is accurately performing these checks.

83. TAKEOFF EVENTS. An applicant shall be required to accomplish each of the following takeoff events. These events may be combined when convenient and practical.

A. Normal Takeoff. A normal takeoff is defined as a takeoff beginning from a standing or rolling start (not from a touch and go) with all engines operating normally during the takeoff and initial climb phase.

B. Instrument Takeoff. An instrument takeoff is defined as one in which instrument conditions are encountered or simulated at or before reaching an altitude of 100 feet above airport elevation. In a flight simulator, the visibility value should be set to the minimum authorized by the operator's operations specifications. An applicant shall be evaluated on the ability to control the airplane, including making the transition to instruments as visual cues deteriorate. An applicant must also be evaluated on the planning of the transition to an instrument navigation environment. This event may be conveniently combined with an area departure.

C. Engine Failure on Takeoff (For Multiengine Airplanes). An applicant must demonstrate the ability to maintain control of the airplane and to continue a takeoff with the failure of the most critical powerplant. When the flight test is conducted in an airplane, the failure shall be simulated. The takeoff configuration, airspeeds, and operational procedures must be in accordance with the operator's aircraft operating manual. When the flight test is conducted in two segments (simulator and airplane), this event shall be conducted in the simulator segment of the flight test. This event should not be repeated in the airplane portion of the flight test unless an unusual situation occurs.

(1) When the flight test is being conducted in an airplane belonging to the transport and commuter category family, the engine failure shall be introduced at a speed after V_1 and before V_2, and appropriateto the airplane and the prevailing conditions. When either V_1 and V_2 or V_1 and V_R are identical, the failure shall be introduced as soon as possible after V_1 is passed.

(2) When the flight test is conducted in an airplane not in the transport and commuter category family, the

engine failure shall be introduced at a speed and altitude that is appropriate for the airplane.

NOTE: Some nontransport multiengine airplanes cannot climb or maintain altitude with an engine out. When conducting a flight test in such an airplane, inspectors and examiners should use their authority to modify this event. For example, an engine failure recognition problem and engine shutdown may be performed at a safe altitude.

D. Rejected Takeoff. A rejected takeoff is a potentially hazardous situation that flightcrews must be trained to handle correctly. As a testing event it must be presented in a realistic and meaningful manner. The event is a test of an applicant's ability to correctly respond to a critical situation and to correctly manage the actions necessary for safeguarding the airplane and passengers once the airplane is brought to a stop.

(1) When a flight test is conducted in a flight simulator, performance parameters should be adjusted to make the takeoff critical. For example, the temperature and airplane weight can be adjusted so that takeoff performance is runway-limited. Another technique is to lower the visibility and make the runway wet, presenting the applicant with a tracking problem. Inspectors and examiners should take care in selecting the malfunction used to induce the reject response. The malfunction should be one that clearly and unequivocally requires rejection of the takeoff. The malfunction should be introduced at a speed that is as close to V_1 as possible, yet still allowing the applicant enough time to perceive and respond to the problem before reaching V_1. It is appropriate for inspectors and examiners to occasionally introduce a problem in a way that leads to an evacuation of the aircraft. This event shall not be waived in a flight simulator.

(2) When a flight test is conducted in an airplane belonging to the transport and commuter category family, a rejected takeoff at approximately V_1 can be unsafe and can cause damage to the airplane. Inspectors and examiners are expected to use caution when inducing a rejected takeoff in an airplane for flight test purposes. For this event to be meaningful, it should be introduced at a speed close to V_1. Therefore, inspectors and examiners are authorized to waive this event and should do so when the airplane weight,ambient temperature, and tire limits preclude the event from being conducted in a realistic manner. In other families of airplanes, the rejected takeoff shall be performed at a speed of less than 50 percent of V_{MC}.

(3) An applicant must be able to recognize the need to initiate a rejected takeoff, perform the correct procedures in a timely manner, and to bring the airplane to a stop on the runway. Once the airplane or flight simulator is brought to a stop, appropriate procedures must be initiated. Consideration must be given to the possibility of overheated brakes and fire.

E. Crosswind Takeoffs. A crosswind takeoff from a standing or rolling start (not a touch and go) must be evaluated to the extent practical on all flight tests. FAR Part 61, Appendix A, does not allow crosswind takeoffs to be waived. When appropriate, a crosswind takeoff may be evaluated simultaneously with other types of takeoffs.

(1) When the flight test is conducted in an airplane, inspectors and examiners will usually have very little control over existing meteorological, airport, and traffic conditions. Inspectors and examiners are expected to make a reasonable attempt to evaluate a takeoff on a runway not favorably aligned with the prevailing wind. It will frequently be necessary, however, to evaluate this event with the crosswind component that exists on the active runway.

(2) Flight simulators are capable of realistically duplicating crosswinds. Crosswind takeoffs shall be evaluated on all flight tests conducted in a flight simulator. The crosswind component entered in the simulator computer shall be between 10 and 15 knots. Occasionally, however, the crosswind components should be in excess of 15 knots, but must not exceed the crosswind component allowed by the operator's aircraft operating manual, or the maximum demonstrated value given in the approved airplane flight manual (AFM). The purpose of testing at such higher crosswind components is to determine whether applicants are being trained throughout the range of the flight envelope. When level A simulators are used, principal operations inspectors (POI) must determine the maximum values at which the crosswind simulation is realistic.

85. CLIMB, EN ROUTE, AND DESCENT EVENTS.

A. Area Departures and Arrivals. The area departure and arrival events should include intercepting radials, tracking, and climbs or descents with restrictions. Whenever practical, a standard instrument departure or standard arrival should be used. Many of the standard procedures, however, are not suitable for the purpose of testing an applicant's abilities. For example, common radar departures are essentially initial climb instructions for a radar hand-off and provide little opportunity for testing an applicant's ability to set up and use the navigation equipment normally used on an area departure. If a suitable published procedure is not available and circumstances allow, the inspector or examiner should give a clearance that presents the desired tests. Inspectors and examiners should allow applicants to use all installed equipment. The autopilot may or may not be used at the inspector's or examiner's discretion. The applicant's use of navigation equipment, and other crewmembers, and the applicant's ability to adhere to air traffic control (ATC) clearances and restrictions shall be evaluated. Inspectors and examiners

may waive one, but not both, of these events. Under normal circumstances, one of the two events should be waived.

B. Holding. Inspectors and examiners should give holding clearances with adequate time available for the applicant to identify the holding fix, select the appropriate speed, and plan the entry. Applicants should be allowed to use all aids normally available in the cockpit (such as wind-drift readouts). At least the initial entry and one complete turn in the holding pattern should be completed before another clearance is issued. The applicant's performance shall be evaluated on the basis of compliance with the holding procedures outlined in the operator's aircraft operating manual, compliance with instructions issued by ATC, and the published holding pattern criteria. Holding airspeed must be as specified by the operator's aircraft operating manual; however, it must not be allowed to exceed the regulatory limit. If the operator's manual requires a speed higher than that allowed by regulation, the applicant must resolve the conflict by requesting an amended ATC clearance or by selecting an aircraft configuration in which it is safe to comply with the regulatory speed. Inspectors and examiners should waive holding when an applicant's performance on other events has indicated a high degree of proficiency.

C. Steep Turns. This event consists of a level turn in each direction with a bank of 45 degrees, continuing for at least 180 degrees, but not more than 360 degrees. Airspeed, altitude, and bank angle must be controlled within the tolerances specified on the job aids. Inspectors and examiners shall direct special attention to an applicant's smoothness, coordination, and orientation. Steep turns may be waived, and should be if an applicant's performance on other events has indicated a high degree of proficiency.

D. Approaches to Stalls. Inspectors and examiners shall evaluate the applicant's ability to recognize and recover from an approach to a stall in three sepa-rate airplane configurations. The three configurations are the clean configuration, the takeoff configuration, and the landing configuration. When the airplane uses only a zero-flap takeoff configuration, the takeoff configuration and the clean configuration stall are combined and only two stalls are required. At least one stall must be performed while in a turn with a bank angle between 15 and 30 degrees.

(1) Approaches to stalls should be entered by increasing the angle of attack smoothly, so that the airspeed decreases at a uniform rate. The use of power during approach to and recovery from stalls should be as specified in the operator's aircraft operating manual.

(2) When stalls are performed in an airplane, the operator's minimum entry and recovery altitudes must be observed. When stalls are performed in a flight simulator or FTD, the operator's minimum entry and recovery altitudes do not have to be observed, and an altitude that is realistic from a performance standpoint and convenient (in terms of the sequence of events) may be used.

(3) When the flight test is conducted in a flight simulator or FTD, inspectors and examiners shall occasionally require an applicant to recover from a high altitude stall. Evaluation of stalls in various flight regimes should be accomplished to determine whether the operator's training program has adequately prepared applicants for flight in those regimes.

(4) An applicant must recognize the first indication of the approaching stall and immediately initiate recovery with a minimal loss of altitude. An actual stall should not be allowed to develop. Procedures used must be in accordance with the operator's aircraft operating manual. Inspectors and examiners may waive all but one of the stalls. This waiver authority should be used when an applicant's performance in other events indicates a high degree of proficiency.

E. Specific Flight Characteristics. This event consists of recovery from flight characteristics specific to the airplane type, such as a dutch-roll or a high rate of descent. These specific flight characteristics, when applicable, are specified in the Flight Standardization Board (FSB) report for the particular airplane type. Inspectors and examiners shall evaluate an applicant on recognition and recovery from these specific flight characteristics, when applicable. The procedures used for recovery must be those specified in the operator's aircraft operating manual. When applicable, this event may be waived. This event should be waived, when the applicant's performance in other events indicates a high degree of proficiency.

87. APPROACH EVENTS. The approaches described in this paragraph are required on all flight tests. They may be combined when appropriate.

A. Instrument Landing System (ILS) or Microwave Landing System (MLS) Approaches. Inspectors and examiners shall require applicants to fly a minimum of one normal (all-engines operative) ILS or MLS. In addition, when multiengine airplanes are used, one manually controlled ILS or MLS with a powerplant failure is also required. When the flight test is conducted as a two-segment flight test, a manually controlled, normal ILS or MLS must be flown in the airplane segment of the flight test.

(1) When the operator's aircraft operating manual prohibits raw data approaches, the flight directors must be used during the manually controlled ILS or MLS approaches. In this case, a raw data approach is not required to complete the flight test.

(2) If the operator's aircraft operating manual permits raw data ILS approaches to be conducted, the operator must provide training in the use of raw data for controlling an aircraft during ILS approaches. If the operator's aircraft are equipped with a flight director system, the flight

director must be used on at least one manually controlled ILS approach. While a raw data approach is not required to complete a flight test, inspectors and examiners should occasionally require a raw data approach to determine whether the operator's training program is adequately preparing applicants.

(3) For all raw data and flight director ILS or MLS approaches flown in a flight simulator or FTD, inspectors and examiners shall require applicants to use a decision height (DH) of 200 feet above the touchdown zone. When raw data is used on ILS or MLS approaches in an airplane, inspectors and examiners shall require applicants to use a DH of 200 feet above the touchdown zone. When the flight director is used on ILS or MLS approaches in an airplane, inspectors and examiners shall require applicants to use a DH of 100 feet above the touchdown zone. However, if the applicant has accomplished an ILS using a 200 foot height above touchdown (HAT) in the simulator segment of the flight test, the published DH shall be used in the airplane portion of the test. The DH shall be determined by barometric altimeter. Inspectors and examiners shall inform applicants that this DH is for flight test purposes only and does not correlate to any minimums used in actual operations. If the flight test is being conducted in actual weather conditions, the DH shall be the published decision height. The applicant must be able to track the localizer and glideslope smoothly and without significant excursion during the final approach segment. Thelocalizer indication shall not exceed 1/4 scale deflection at DH. When the ILS indicator is calibrated with the first dot at the 1/2 scale deflection point and a second dot at the full-scale point, the deflection at DH must not exceed half the distance to the first dot. The glideslope shall not exceed 1/2 scale deviation (one dot) at decision height.

(4) When the operator's airplanes are equipped with autopilot couplers, at least one coupled autopilot ILS or MLS approach must be flown. If the autopilot has the capability and the operator is authorized by operations specifications to conduct automatic landings, the coupled approach shall terminate in either an autolanding or a coupled missed approach. When an autoland is conducted, it shall not be credited as one of the three required manually controlled landings. When the flight test is conducted entirely in an aircraft or entirely in a flight simulator, the autopilot coupled approach may be combined with the normal ILS (all-engines operative) approach. This combination is permitted because the applicant's ability to manually control an ILS approach is evaluated on the ILS with an engine out.

(5) Qualification for Category (CAT) II and CAT III operations are not part of a type rating or ATP flight test. To satisfy the requirements for these types of operations, additional events that are not required for the ATP certificate or a type rating will normally be required. The qualification checks for these types of operations, however, may be conducted in conjunction with an ATP or type rating test as a convenience to the operator and the applicant. However, if one of these additional events is unsatisfactory, the entire flight test is unsatisfactory. Therefore, the choice of whether to combine these events with the certification flight test is up to the applicant. Inspectors and examiners shall ensure that applicants understand these ground rules before conducting these additional events in conjunction with a certification test.

(6) Qualification check requirements for CAT II and CAT III operations, including the required number and types of approaches are established by the operator's approved training program. If an applicant is simultaneously qualifying for these authorizations during the certification flight test, the approaches discussed in subparagraphs (1), (2), and (3) may be credited toward these requirements when the approach requirements are compatible.

(7) Inspectors and examiners shall use a crosswind component of 8 to 10 knots (not to exceed 10 knots) on at least one of the ILS or MLS approaches conducted in a flight simulator. The use of this crosswind is to evaluate the applicant's ability to track the localizer and not the applicant's ability to accomplish a crosswind landing.

(8) When the flight test is conducted in a flight simulator or FTD, the runway visual range (RVR) should be set to the minimum value specified for the approach. If the inspector or examiner plans for the applicant to acquire the runway and to continue below DH, the ceiling should be set to a value of approximately 50 feet above HAT (the exact value depends on the characteristics of the specific simulator). When the flight test is conducted in an airplane, the vision restriction device must remain in use until just before the airplane arrives at the DH used for the flight test.

(9) Flightcrew procedures, airplane configuration, and airspeeds must be as specified in the operator's aircraft operating manual. Turbojet airplanes must be stabilized before descending below 1,000 feet above the touchdown zone.

B. Nonprecision Approaches. Inspectors and examiners shall require applicants to demonstrate two nonprecision instrument approaches that are authorized in the operator's operations specifications. The second approach must be based on a different type of navigational aid (NAVAID) than the first approach. The second approach may be waived, if an applicant demonstrates a high degree of proficiency on the first approach and the applicant's training records or instructor certification show that the applicant has satisfactorily completed the nonprecision approach training requirements.

(1) Inspectors and examiners shall allow the applicant to use any aid normally available in the cockpit, such as the flight director and drift and groundspeed readouts. Many operators train their pilots to perform nonprecision approaches using the autopilot. At least one nonprecision

approach must be manually flown on the flight test, except when the operator's manual prohibits manually flown nonprecision approaches.

(2) When nonprecision approaches are conducted in a flight simulator, a crosswind component of 10 to 15 knots shall be used on at least one of the nonprecision approaches. The purpose of the crosswind component is to test an applicant's ability to track the approach course, not to evaluate crosswind landings. Crosswind landings, however, may be combined with a nonprecision approach.

(3) In an airplane, the vision restriction device shall remain in use until the airplane arrives at minimum descent altitude (MDA) and a distance from the runway approximating the required visibility for the approach. In a flight simulator or FTD, inspectors and examiners shall enter a ceiling of approximately 50 feet higher than the published MDA. A visibility value of approximately 1/4 mile greater than the published minimums value shall be used, depending on the characteristics of the particular flight simulator or FTD.

NOTE: If the approach to be conducted is an LNAV/VNAV with a published decision altitude (DA), the simulator visibility should be set to the height above touchdown (HAT) at the DA, divided by 300 feet (a constant); then add one-quarter mile.

Example:

To set simulator visibility where DA=1000 ft and HAT at DA=600 ft
Divide 600 ft by 300 ft - 2 (miles visibility)
Add 1/4 mile visibility
Set simulator visibility at 2 1/4 miles

This setting permits the flightcrew to acquire the approach lights visually before reaching the published DA, and precludes an unnecessary missed approach when the approach is otherwise satisfactory.

(4) When tracking is accomplished by means of an automatic direction finder (ADF) bearing pointer, the tolerance is ±5 degrees of the final approach course. When tracking a localizer signal, the tolerance is a 1/4 scale deviation (1/2 DOT). When tracking a very high frequency omnidirectional range station (VOR) signal, the tolerance is a 1/4 scale deviation of the course deviation indicator. The reason for these tolerances is terrain. Also, at the visual descent point or its equivalent, the aircraft must be in a position that it can be aligned with the runway without excessive maneuvering. Turbojet airplanes must be stabilized before descending below the MDA or 500 feet, whichever is lower.

C. Circling Approach Maneuver. Operators are not required to train flight crewmembers in circling approach maneuvers if the operator's manual prohibits such maneuvers with a ceiling below 1,000 feet and a visibility of less than 3 miles. Inspectors and examiners shall waive this event if the operator does not train flight crewmembers for the maneuver. If the operator provides training on the circling maneuver, it may be waived when local conditions beyond the control of the inspector or examiner, such as traffic or available approaches, prevent the maneuver from being conducted in a realistic manner.

(1) For the purpose of flight testing, the visual maneuvering portion of a circling maneuver begins at the circling MDA of a nonprecision approach and requires a change in heading from the final approach course to the runway heading of at least 90 degrees. The inspector or examiner, however, is authorized to modify this event. For example, when traffic conditions preclude a circling approach, if tower approval is attained, the visual portion of the event can be entered from a modified visual flight rules (VFR) traffic pattern at a point downwind and abeam the touchdown point.

(2) The angle of bank for a circling maneuver should not exceed 30 degrees. Altitude and airspeed must not exceed the tolerances specified on the job aid. The airplane must not descend below MDA until the runway environment is clearly visible to the applicant, and the airplane is in a position for a normal descent to the touchdown point. Turbojet airplanes must be stabilized in the landing configuration before descending below the MDA or 500 feet above touchdown zone elevation, whichever is lower.

D. Maneuver To a Landing With 50 Percent of Powerplants Inoperative. Inspectors and examiners shall require an applicant to demonstrate an approach and landing with 50 percent of powerplants inoperative.

(1) Inspectors and examiners should introduce this event in a realistic manner. Consideration should be given to the airplane weight, atmospheric conditions, and airplane position. The airplane position, when the engine failure is introduced (second engine in a three- or four-engine airplane) should provide enough room for the applicant to maneuver the aircraft. In the simulator, the weight should be adjusted to simulate realistic conditions but still allow the applicant enough time to exercise judgment. In a three-engine airplane, this event must be performed with the center and an outboard engine failed. In a four-engine airplane, both powerplant failures must be on the same side.

(2) In two-engine airplanes, the engine-out ILS or MLS may be credited simultaneously with this event. In three- and four-engine aircraft, this event should be conducted in visual conditions. A visual pattern should be used rather than a vector to the final approach, so that the applicant's judgment with respect to maneuvering the airplane can be evaluated. When this event is conducted in a flight simulator, the electronic glideslope or visual approach slope indicator (VASI) shall not be made available for the

applicant's use. In the airplane, it may not be possible to have the VASI's turned off. In daylight conditions, however, inspectors and examiners should request that the VASI be turned off. In an airplane at night, an electronic glideslope or VASI must be available and used.

FYI: An approach with a simulated failure of the most critical powerplant must always be performed in the airplane segment of a two-segment flight test. That event is required in the airplane segment, even when a maneuver and landing with 50 percent of powerplants inoperative has already been previously accomplished in a flight simulator.

E. No-Flap or Partial-Flap Approach. Inspectors and examiners shall require an applicant to perform a no-flap approach in all airplanes except those airplanes that have alternate flap extension procedures and in which the FSB has determined that no-flap approaches are not required. If a no-flap approach is not required, the FSB may still require that a partial-flap approach be accomplished. In this case, inspectorsand examiners are only required to evaluate an applicant's demonstration of a partial-flap approach. However, inspectors and examiners may evaluate applicants conducting partial-flap or no-flap approaches any time procedures for such approaches are published in the operator's aircraft operating manual.

(1) For either a partial or no-flap approach, the limitations specified for the use of VASI and electronic glideslope guidance in the 50 percent engine failure maneuver (see subparagraph 87D(2)) apply. The approach shall be flown from a visual pattern from at least a downwind position, so that the applicant may be evaluated on planning for the approach. The approach should be presented in a realistic manner. In a flight simulator, inspectors and examiners shall adjust the landing weight to require an applicant to exercise judgment in matters such as approach speed and runway limitations.

(2) When the flight test is conducted in a transport or commuter category airplane, a touchdown from a no-flap or partial-flap approach is not required and shall not be attempted. The approach must be flown to the point that the inspector or examiner can determine whether the landing would or would not occur in the touchdown zone. In a flight simulator, the landing must be completed to a full stop so that the applicant's ability to control the airplane and to use correct procedures may be evaluated.

NOTE: The events required in subparagraphs 87D and E should be conducted in a flight simulator whenever practical. These events should not be repeated in the airplane segment of the flight test unless an unusual situation occurs.

F. Acceptable Performance for Approach Events. The airspeed and altitude on downwind and base leg, or on an intercept to final approach must be as specified in the operator's flight manual. The airspeed on final approach must be adjusted for wind and gusts in accordance with the flight manual and must be positively and accurately maintained throughout the approach. The approach angle must be controlled and be appropriate to both the airplane and approach being flown. If a windshear or a ground proximity warning should occur, an applicant must respond in a prompt and positive manner. For turbojets, the approach must be stabilized, the airplane in the landing configuration, with a sink rate of less than 1,000 feet per minute (FPM), not later than the following heights:

(1) For all straight-in instrument approaches, the approach must be stabilized before descending below 1,000 feet above the airport or touchdown zone.

(2) For visual approaches and landings, the approach shall be stabilized before descending below 500 feet above the airport elevation.

(3) For the final segment of a circling approach maneuver, the approach must be stabilized 500 feet above the airport elevation or at the MDA, whichever is lower.

NOTE: Use of the stabilized concept is mandatory for all turbojet aircraft operations. It is recommended for all propeller-driven aircraft and rotorcraft when conducting operations in instrument flight rules (IFR) weather conditions.

89. LANDING EVENTS. A total of three manually controlled landings must be accomplished on all flight tests. When a two-segment, flight simulator and airplane flight test is conducted, a minimum of three manually controlled landings must be performed in the airplane. If the flight test is conducted in an amphibious airplane, one landing must be on water. The required events are as follows:

A. Normal Landings. A normal landing is defined as a manually controlled landing in the normal landing configuration (as specified in the operator's aircraft operating manual), with normal power available, and without reference to an electronic glideslope. A normal landing can be accomplished from either a visual pattern or from a nonprecision approach.

B. Crosswind Landings. A manually controlled landing with a crosswind must be accomplished on all flight tests. FAR Part 61, Appendix A, does not permit crosswind landings to be waived. The crosswind landing may be combined with any other landing event.

(1) When the flight test is conducted in an airplane, inspectors and examiners usually have little control over existing meteorological, airport, and traffic conditions. As such, an inspector or examiner is expected to make a reasonable attempt to evaluate a landing on a runway not favorably aligned with the prevailing wind. It will frequently be neces-

sary, however, to evaluate this event with the crosswind component currently existing on the active runway.

(2) Flight simulators are capable of realistically duplicating a crosswind for landing. Crosswind landings must be evaluated on all flight tests conducted in flight simulators. The crosswind component entered in the simulator computer shall be between 10 to 15 knots. Occasionally, however, the crosswind components should be in excess of 15 knots, but must not exceed the crosswind component allowed by the operator's aircraft operating manual (or the maximum demonstrated value given in the AFM). The purposeof testing at such higher crosswind components is to determine whether applicants are being trained throughout the range of the flight envelope. When level A simulators are used, POI's must determine the maximum values at which the crosswind simulation is realistic. Crosswind landings should normally be performed from a VFR traffic pattern, but may be accomplished from a nonprecision approach.

C. Landing in Sequence from an ILS or MLS Approach. On the landing from an ILS or MLS approach, the runway environment should become visible to the applicant as close as possible to the DH being used for the flight test. The applicant must complete the landing without excessive maneuvering and within the touchdown zone. The approach angle must not be erratic, excessively steep, or shallow in the visual segment.

D. Accuracy Landings (Single-Engine Only). The accuracy landing event consists of three approaches and spot landings from an altitude of 1,000 feet or less, with the engine throttled and an approach requiring a 180-degree change of heading. ("Throttled" means that as power is reduced, it shall not again be increased above that point until after touchdown.) Touchdown must be in a normal landing attitude and configuration, beyond but within 200 feet of a designated point. One of the three landings must be from a forward slip. Although circular approaches are acceptable, two 90-degree turns with a straight base leg are preferred. This event is not required if the applicant holds a commercial pilot certificate.

E. Rejected Landing. The rejected landing shall be initiated from a point approximately 50 feet above the runway. This event may be combined with an instrument missed approach.

F. Engine-Out Landing. One landing with the most critical powerplant inoperative must be evaluated. When a two-segment flight test is conducted, this event must be performed in the airplane. When conducted in an airplane, the engine failure shall be simulated.

G. Landing with 50 Percent of Powerplants Inoperative. A landing with 50 percent of powerplants inoperative must be evaluated. In a three-engine airplane, the event must be performed with the center and one outboard engine inoperative. In a four-engine airplane, both powerplant failures must be on the same side. When this event is conducted in an airplane, the engine failures shall be simulated.

H. No-Flap or Partial-Flap Landings. No-flap or partial-flap landings are not required to complete the flight test. When the flight test is conducted in a transport category airplane in actual flight, a touch- down from a no-flap or partial-flap approach is not required and shall not be attempted. The approach must be flown to the point that the inspector or examiner can determine whether the landing would or would not occur in the touchdown zone. In a flight simulator, the landing should be completed to a full stop so that the applicant's abilities to control the aircraft and use correct procedures under abnormal circumstances may be evaluated. For example, the aircraft might have a pitch-up tendency with spoiler extension in the no-flap or partial-flap landing configuration.

I. Acceptable Performance for Landing Events. Landings must be in the touchdown zone, at the correct speed for the airplane, without excessive float, and on the runway center line. The rate of descent at touchdown must be controlled to an acceptable rate for the airplane involved. Side load on the landing gear must not be excessive, and positive directional control must be maintained through the rollout. Management of spoilers and thrust reversers must be in accordance with the operator's aircraft operating manual.

91. MISSED APPROACH EVENTS. Missed approaches from two separate instrument approaches are required to complete the flight test. At least one missed approach must be flown through the entire missed approach procedure, unless traffic or ATC restrictions prevent completing the entire procedure. One missed approach is required from an ILS or MLS. When the flight test is conducted in a multiengine airplane that has a single-engine climb capability, one missed approach should be accomplished with the most critical powerplant inoperative. The engine-out and ILS or MLS missed approaches may be combined; however, to complete the flight test, at least two missed approaches are required. When the flight test is a two-segment flight test, the engine-out missed approach should be accomplished in the simulator segment.

A. When a flight test is conducted in an airplane that does not belong to the transport or commuter category family, airplane performance may be critical. Inspectors and examiners should use their authority to modify the event. For example, a missed approach may be combined with a simulated powerplant failure at a safe altitude.

B. A missed approach from an approach with 50 percent of powerplants inoperative is not required to complete the flight test for three- and four-engine airplanes. However, when procedures for 50 percent of powerplant-inoperative missed approaches are published

in the operator's aircraft operating manual, inspectors and examiners may evaluate the event todetermine if applicants are being trained to proficiency in the event. When this event is conducted in a three-engine airplane, the center and one outboard engine must be inoperative. When this event is conducted in a four-engine airplane, two engines on the same side must be inoperative. When the missed approach event is conducted in an airplane, the engine failures shall be simulated.

C. When a flight test is conducted in a flight simulator or FTD, inspectors and examiners should make use of the "trouble buttons," as well as weather, to induce the missed approach decision. For example, many flight simulators have provisions to offset the localizer so that the airplane is not in a position to continue the approach below DH.

D. Applicants must promptly execute the missed approach procedure if the runway environment is not acquired at DH on an ILS or MLS approach. If the runway environment is not in sight on a nonprecision approach, or if the aircraft is not in a position to land at the missed approach point, the applicant must initiate a missed approach. Should conditions prevent continuation of any type of approach at any point, the applicant must initiate a missed approach. For example, a missed approach above DH might be required when an instrument failure flag appears. A missed approach is required if the aircraft is below DH or MDA and cannot be properly aligned with the runway or if the applicant loses sight of the runway environment. An applicant must adhere to the published missed approach or the instructions given by ATC and observe the procedures and limitations in the operator's aircraft operating manual. An applicant must properly use the available aids and other crewmembers when making the transition back to the instrument navigation environment.

93. NORMAL AND ABNORMAL PROCEDURES. Inspectors and examiners shall require an applicant to demonstrate the proper use of as many of the airplane's systems and devices as necessary to determine if the applicant has a practical knowledge of the use of these systems. Evaluation of normal and abnormal procedures can usually be accomplished in conjunction with other events and does not normally require a specific event to test the applicant's use of the airplane's systems and devices. An applicant's performance must be evaluated on the maintenance of aircraft control, the ability to recognize and analyze abnormal indications, and the ability to apply corrective procedures in a timely manner. Systems to be evaluated include, but are not limited to, the following:

- Anti-icing and deicing systems
- Autopilot systems
- Automatic or other approach system aids
- Stall warning devices, stall avoidance devices, and stability augmentation devices
- Airborne radar devices
- Any other available systems, devices, or aids, such as flight management systems (FMS)

95. EMERGENCY PROCEDURE EVENTS. An applicant must be able to competently operate all installed emergency equipment and to correctly apply the procedures specified in the operator's aircraft operating manual.

A. Powerplant Failures. Inspectors and examiners may introduce malfunctions requiring an engine shutdown at any time during the flight test. This provision is not intended as authority to require an unrealistic number of failures, but to permit such failures at times when they are most appropriate. Powerplant failures should be limited to those necessary for determining an applicant's proficiency. An applicant must promptly identify the inoperative engine and initiate correct action while maneuvering the airplane safely. If the airplane is not capable of maintaining altitude with an engine inoperative, the applicant is expected to maintain the best engine-out climb speed while descending. Smooth application of flight controls and proper trim are required.

B. Other Emergency Procedures. Inspectors and examiners should sample as many of the following events as necessary for determining whether an applicant is proficient in identifying and responding to emergency situations:

- Fire in flight
- Smoke control
- Rapid decompression
- Emergency descent (with and without structural damage)
- Hydraulic and electrical system failure or malfunctions (if safe and appropriate)
- Landing gear and flap systems failure or malfunctions
- Navigation or communications equipment failure
- Any other emergency procedures outlined in the operator's aircraft operating manual or training program

97. STANDARDS OF ACCEPTABLE PERFORMANCE. The Airline Transport Pilot Certificate is the highest grade of pilot certificate awarded. An applicant for this certificate must possess a degree of piloting skills beyond that required for lower grades of certificates. The applicant must be the master of the airplane, the crew, and the situation throughout the aircraft's operational envelope. Inspectors and examiners shall sample an applicant's ability to safely and practically operate the aircraft throughout the range of the approved operational envelope. For example, an ATP applicant would be expected to be able to maintain 180 knots to the marker, configure the aircraft, and establish a stabilized approach before descending below

1,000 feet above ground level (AGL) while smoothly tracking the glide slope and localizer.

A. Manipulative Skills. The manipulative skill standards for the ATP certificate are the most rigorous of all pilot certificates issued. The skills requirement for the ATP certificate and for other certificates differs not in the tolerances allowed but in the degree of mastery required. The applicant for an ATP certificate must demonstrate the ability to operate the aircraft smoothly under a complex set of circumstances. The applicant's performance must be such that the inspector or examiner is never seriously in doubt of the successful outcome of each event of the flight test. The determination of whether an applicant's performance is acceptable or not is derived from the experience and judgment of the inspector or examiner. It is imperative that inspectors and examiners be fair and consistent when making their determinations. For example, weather, aircraft responsiveness, traffic, and other factors beyond an applicant's control may cause the applicant to deviate briefly during the accomplishment of a maneuver. In the case of turbulence, the applicant is expected to adhere to the procedures for adjusting the target speed as specified in the operator's aircraft operating manual. In such a situation, an applicant who makes a determined effort, is generally successful in maintaining close control, and who does not deviate to the extent safety is compromised, should be considered to have met the standard.

B. Flight Management Skills. The term "pilot-in-command" implies that the pilot is the leader of a crew and bears the final responsibility for the safe conduct of the flight. This standard, more than any other, distinguishes the successful applicant for an ATP certificate from those holding other grades of certificates. The ATP flight test must not be limited to a simple demonstration of a series of events. An ATP applicant must demonstrate a mastery of complex problems, good judgment, situational awareness, cockpit management, and leadership skills.

98.-104. RESERVED.

FIGURE 5.2.2.1.
ATP/TYPE RATING ORAL TEST JOB AID—AIRPLANE

THE ORAL TEST

[ ] A. Knowledge of aircraft systems:

[ ]	Hydraulic	[ ]	Electrical
[ ]	Pneumatic	[ ]	Powerplants
[ ]	Flight instruments	[ ]	Flight controls
[ ]	Landing gear, wheel	[ ]	Autopilot, F/D
[ ]	EFIS, FMS	[ ]	Navigation systems
[ ]	Fuel	[ ]	Propellers
[ ]	Pressurization	[ ]	Air conditioning

[ ] B. Knowledge of, and ability to, compute performance data, takeoff, landing, and cruise performance

[ ] C. Knowledge of the flight engineer station

[ ] D. Weight and balance

[ ] E. Ability to perform or state immediate action items

[ ] F. Knowledge of, and ability to, state operating limitations

[ ] G. Knowledge of MEL

[PAGES 5-63 THROUGH 5-68 RESERVED]

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